AOIT Computer Networking

Lesson 12

Host Access

Student Resources

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Student Resource 12.1

Anticipation Guide: Internet Services

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: For each of the statements below, underline “I agree” if you think the statement is accurate or “I disagree” if you disagree with it. Write one reason to explain your guess.

|  |  |
| --- | --- |
| **Although DSL Internet travels through your home telephone line, you can still make phone calls while using the Internet.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Cable Internet is used by people from rural areas who can’t connect to the Internet using other services.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Cable Internet is offered through a telephone service provider.** | | |
| My guess: | I agree I disagree | |
| My reason: |  | |
| I learned: |  | |
| **With DSL, it’s just as fast to upload files as it is to download them.** | | |
| My guess: | I agree I disagree | |
| My reason: |  | |
| I learned: |  | |

|  |  |
| --- | --- |
| **Business users often use satellite Internet, because they can afford to have their own satellite dish.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Having a leased line means that you rent the full phone line for your Internet service, so the telephone company guarantees a certain Internet speed.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **Dial-up service never became popular because it’s too slow.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |
| **To use DSL service, you need to put special filters on phones.** | |
| My guess: | I agree I disagree |
| My reason: |  |
| I learned: |  |

Student Resource 12.2

Reading: Internet Services

Directions: Read about each of the following types of Internet services to learn about different ways to connect to the Internet from a residential network or a business network.

Digital Subscriber Line (DSL)

DSL provides Internet access over telephone lines, which are sometimes called the plain old telephone service (POTS). Data (Internet) and voice (telephone) are run at different frequencies on the same cable via a technology called *multiplexing*. So when you connect to the Internet via DSL, it does not tie up the phone line. You can make phone calls while using the Internet and access all kinds of multimedia services like video, live online games, and image-heavy websites. Multiplexing is commonly known as *broadband Internet*.

Users connecting with DSL need an Ethernet network adapter card in their computer and a DSL modem that is a separate box from the computer. Additionally, since the connection runs over the phone lines, users need special phone filters that allow voice calls during data transfer.

The best DSL speeds are about 6 Mbps (megabits per second) for downloading, which is usually adequate for downloading videos, gaming, and streaming videos. Since most home users download many more files and websites than they upload, DSL allots more bandwidth speed to downloads. DSL thus provides what is called an *asymmetric connection*, which means that uploading files will take longer than downloading them.

Very high bit-rate digital subscriber line (VDSL) is the new generation of DSL, with super-accelerated rates up to 52 Mbps for downloading and 12 Mbps for uploading. For example, AT&T’s U-verse service offers clients VDSL with download speeds up to 28 Mbps.

One limitation of DSL service is that the longer the phone line between your residence and the service provider’s hub, the less bandwidth DSL can support. The maximum length of phone lines for a DSL connection is about 3.4 miles. This means that if the phone line between you and your service provider is close to 3.4 miles, your service might be slower. Keep in mind that phone lines are usually strung along winding routes, so the limit isn’t a bird’s-eye distance from your service provider. If you are too far from an ISP to run DSL, then cable Internet is your best bet for getting a fast and reliable connection.

Cable Internet

Cable Internet is comparable in speed and cost to DSL but has some key technical differences. Cable Internet isn’t offered through your phone lines, but uses channels on your TV’s cable connection. It is offered by the same service provider you order cable TV from.

With a cable Internet connection, you share the cable Internet service with your neighbors, and your bandwidth speeds will depend on how much everyone on the network is downloading. At peak times, the Internet connection might be slower than it is in the middle of the night when no one is using the Internet.

Like DSL, cable also provides an asymmetric connection. This means you can download faster than you can upload files, because more channel space is allotted for downstream data transfer.

If you decide to use cable Internet, you will need to get a cable modem and have an Ethernet network adapter card in your computer. You can also connect to a cable modem using a USB cable, but your speed will be slower as a result.

Leased Line (T1, T3, or OC3)

Instead of subscribing to one of the services described above, many businesses lease a line for their Internet service. By leasing their own line from a phone company, they have a guaranteed bandwidth and speed, which is just as fast for uploading as it is for downloading. This is especially useful for companies that provide web services or host a website, since users will be downloading information from the company servers (and the servers will be uploading the information).

T1 lines, which have a speed of 1.544 Mbps, used to offer the fastest connection, but modern-day DSL and cable Internet networks are actually faster. However, higher speed circuits like T3 (45 Mbps) and OC3 (155 Mbps) are comparable to or faster than DSL and cable.

Satellite Internet

In many parts of the United States and the world, DSL and cable television lines are not available. Many people live without modern technology, either because they can’t afford it or because they are just too far from any of the service providers. For these communities, satellite Internet is a viable alternative.

With satellite Internet service, the user connects through a satellite dish that receives and broadcasts signals. The service is slower than DSL or cable but faster than a dial-up connection.

Dial-Up Modems

Just fifteen years ago, nearly everyone used a dial-up modem for connecting to the Internet. A modem connects a computer to the Internet via a land telephone line. Compared to newer technologies, dial-up is a very slow way to connect to the Internet. It may be too slow and unreliable to load video, online games, or Flash and multimedia websites.

Another limitation of dial-up is that accessing the Internet over dial-up ties up your phone line. If someone tries to call you, you will have to place your Internet connection on hold if you want to answer the phone.

Today, only 3% of the Internet connections in the United States are dial-up. Most dial-up users are in locations where they cannot access the Internet through DSL or cable.

Student Resource 12.3

Investigation Notes: Residential Network

Student Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_

Directions: Investigate a home Internet connection and record your findings on this resource. If you don’t have a connection in your home, ask a friend, classmate, relative, or teacher to let you take a look at his or her network. Find out who administers the network (who purchased and pays for service) and whether that person is satisfied with the service. You will need to ask if you can perform some diagnostic tests to analyze the network, using an online bandwidth speed tool to test the network speed.

1. What type of Internet connection is being used (DSL, VDSL, cable, dial-up, etc.)?
2. Is the service reliable, and are users satisfied with it? What download speed were they promised?
3. Why did the users choose this service over their other options? Was it the cost, features, reliability, speed, a recommendation they received, other options not being available, something else?
4. Draw or describe the topology of the network: what kind of cable is used, what external modems or routers are used, and so forth.
5. Use one of the following online tools to test the network speed. Record the results below.

<http://www.speedtest.net/>

<http://reviews.cnet.com/7004-7254_7-0.html>

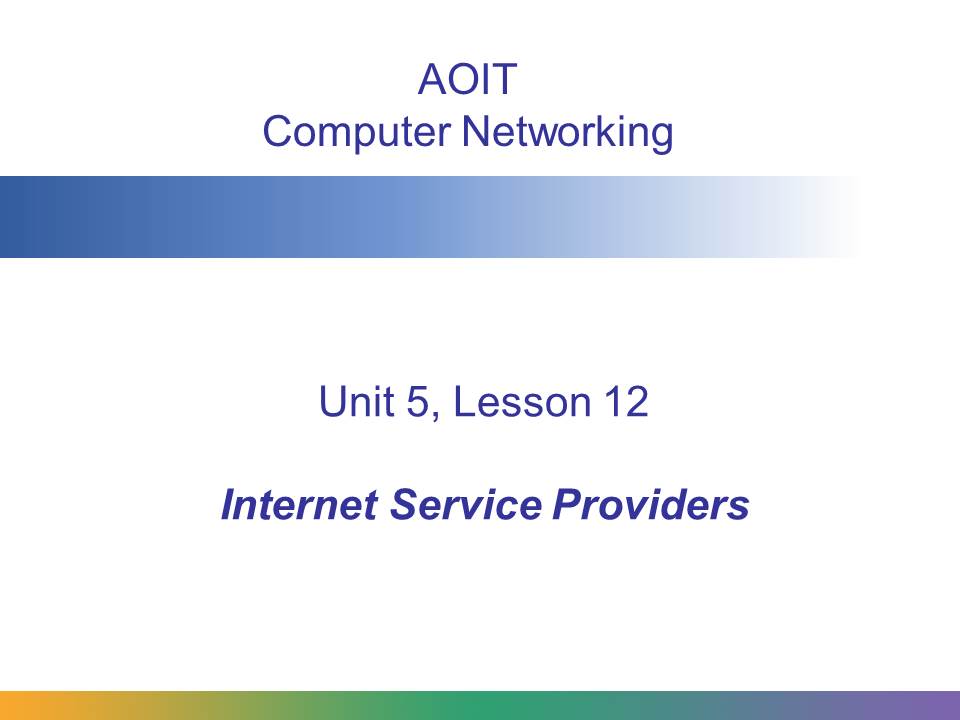
<http://www.bandwidthplace.com/>

<http://www.dslreports.com/stest>

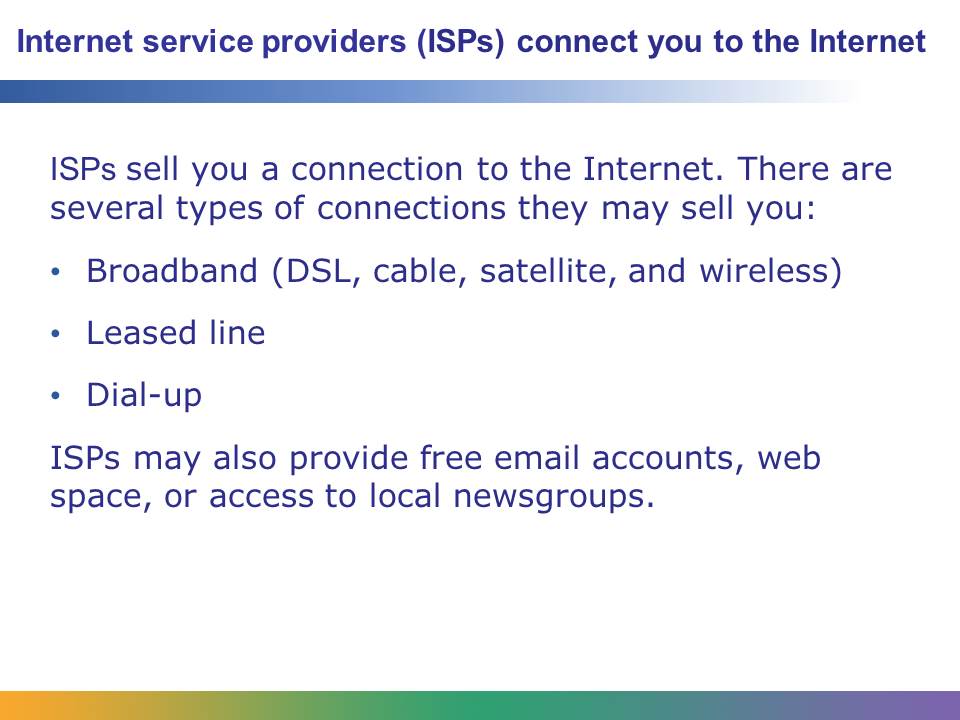
* + Download speed:
  + Upload speed:

Student Resource 12.4

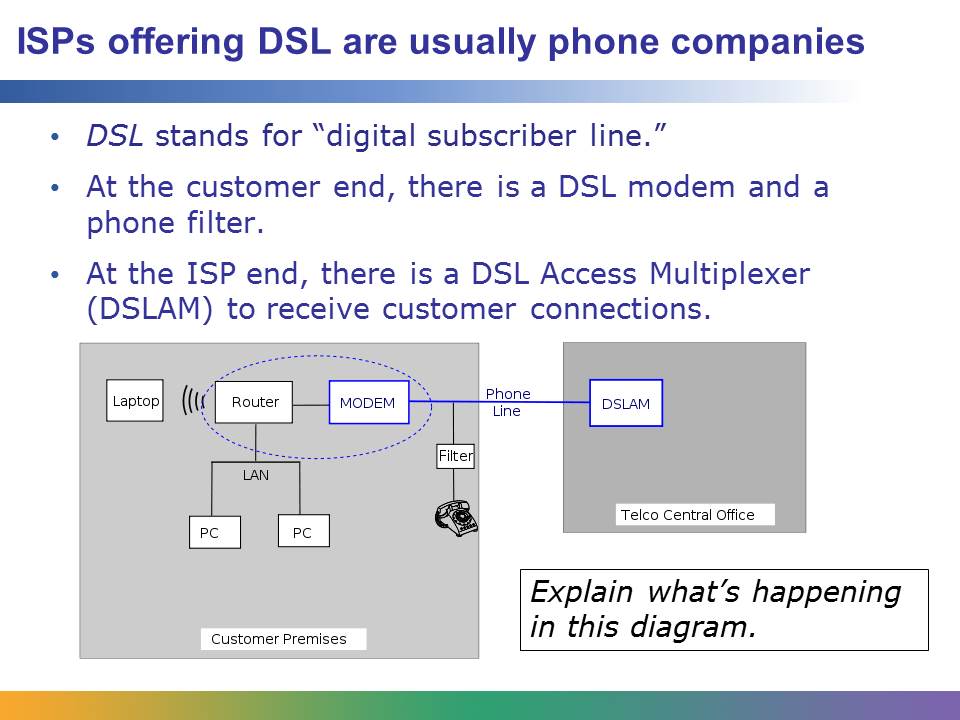
Reading: Internet Service Providers



This presentation explains what an Internet service provider, or ISP, is. It describes the different types of ISPs that are available and explains how an ISP connects you to the Internet.



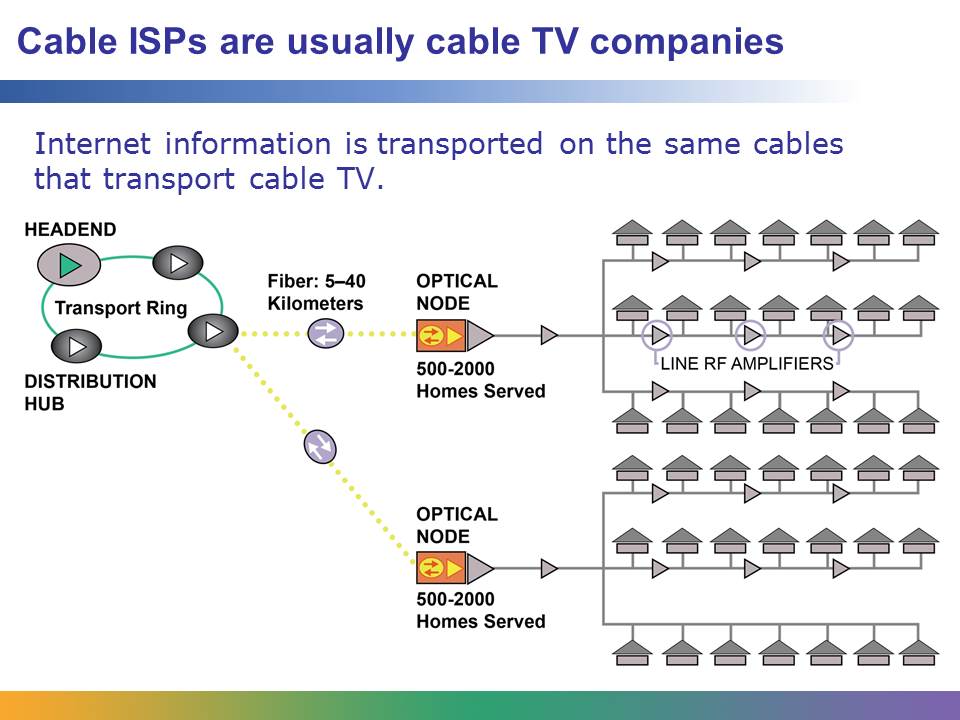
When you decide on an ISP, it’s important to know which one offers the most effective service at the best price for your location. Depending on your location, you may have a choice of DSL or cable. If your location does not have access to DSL or cable lines, you may need to consider a satellite or dial-up ISP. If you have a business, or if you need extremely reliable service and are willing to pay for it, you may consider a leased-line ISP.



DSL requires equipment at the customer end and at the Internet service provider end. At the customer’s location, there is a DSL modem. A DSL filter is installed on each outlet for telephone handsets, to remove the high-frequency band. This eliminates interference with the operation of the telephone and enables simultaneous use.

At the service provider location, there is a DSL Access Multiplexer (DSLAM) to receive customer connections. A DSLAM takes connections from many customers and aggregates them onto a single high-capacity connection to the Internet.

For the most part, your choice of ISPs for DSL service is limited to the same companies that provide phone service in your area, or a secondary provider who is actually reselling you the same DSL service supplied by your phone company.

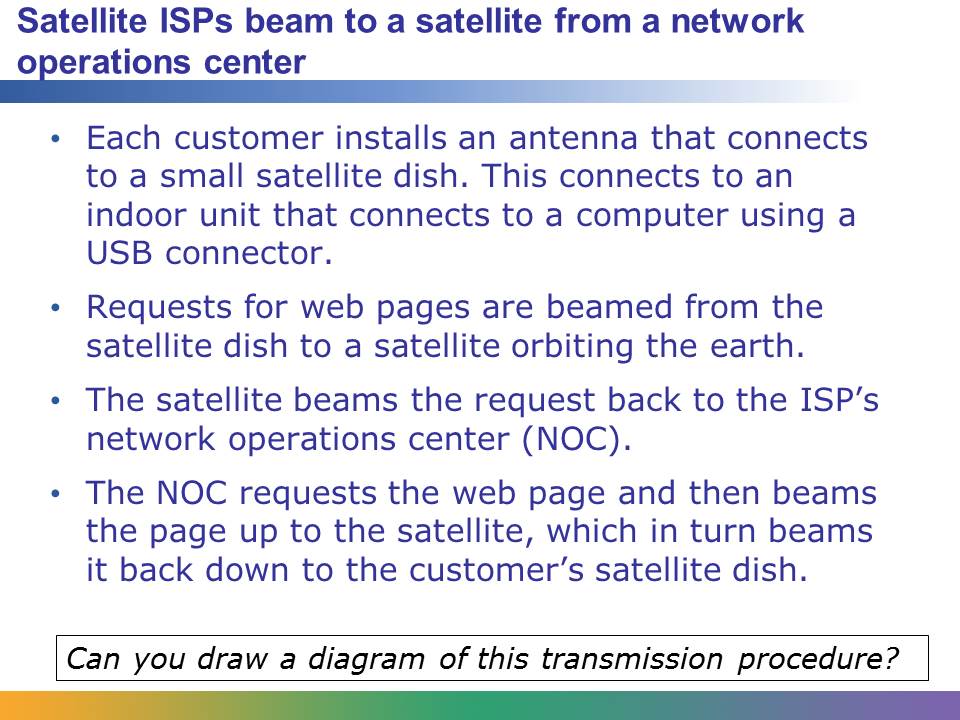


When you sign up for a cable broadband Internet connection, generally the ISP provides you with a cable modem that has a USB port, an Ethernet port, or both USB and Ethernet ports. This modem communicates with the cable modem termination system (CMTS) located at the ISP station (sometimes called a “headend”).

One big difference between cable and DSL is that on a cable network, all houses in your neighborhood use the same cable, whereas with DSL, Internet access is provided through your individual phone line. So the data transmission speed for cable may vary according to how many subscribers are using the service at the same time.

Data coming from the Internet to your cable modem uses a 6 MHz channel, just like a single channel of cable TV. Data going from your cable modem to the Internet requires just 2 MHz of bandwidth.

In some areas, cable TV companies and telephone companies are switching to fiber-optic cables to provide higher bandwidth and less speed degradation to customers.

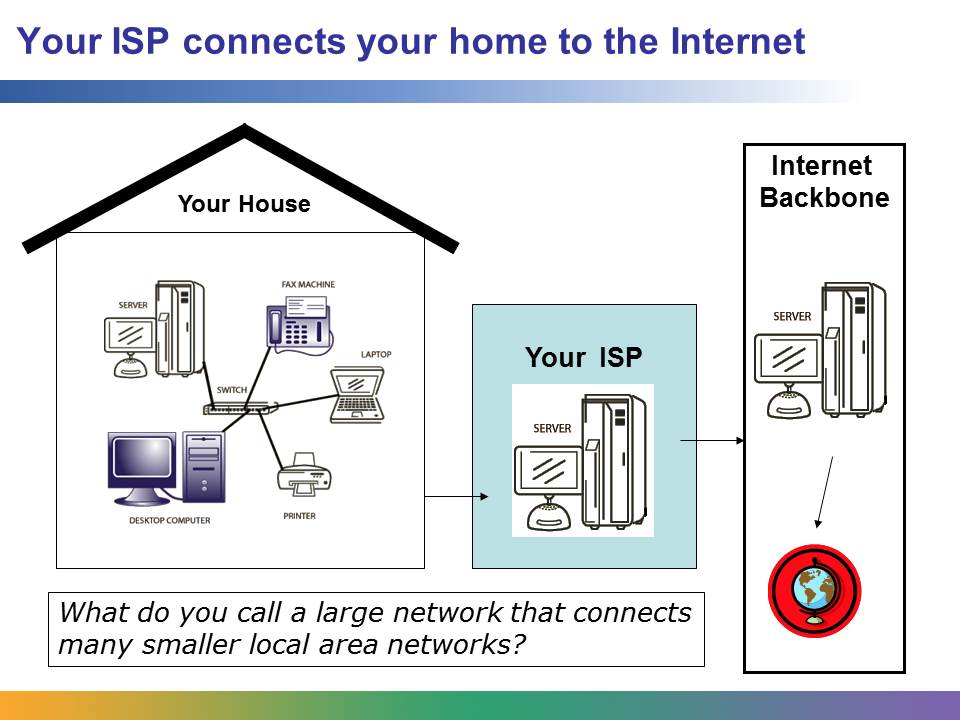


When the customer sends a request for a web page, the satellite software attaches a piece of code (called a tunneling code) to the request. The request is then beamed from the satellite dish installed on your house to a satellite orbiting the earth. The satellite relays the request back down to the earth to the ISP’s network operations center, or NOC, which is where the customer’s actual Internet connection is located. The NOC requests that web page for you and then beams it up to the satellite in space. The satellite beams the page back down to the dish on the customer’s house, and the dish sends the web page through the satellite modem and onto the PC monitor. The whole process typically takes less than half a second!

Typically a completely clear line of sight between the satellite dish and the satellite is required for the system to work. The signal can be absorbed and scattered by rain, and the signal is also impacted by the presence of trees and other vegetation in its path.

The satellites used for two-way Internet service orbit 23,000 miles or more above the equator. This means that a round-trip transmission travels a total of about 92,000 miles. Even though the signals travel at nearly the speed of light, this accounts for more delay than found in earth-based networks. This delay is known as latency.

As with cable modem ISPs, your data transmission speed may vary according to how many subscribers are using the service at the same time as you.



The type of ISP you choose determines how you connect with your ISP—whether it’s a telephone line, a cable, or a wireless satellite.

Once you are connected to your ISP, the information you send over the Internet gets routed through your ISP’s servers and out to other servers on the Internet on fiber-optic cables. These main Internet servers handle a lot of traffic and are connected also via thick fiber-optic cables. The main Internet servers are known as the Internet backbone. There are backbones across the world that carry data globally, routing data packets along the quickest, smoothest path to their destinations.

Since the Internet covers a large area, it is known as a wide area network, or WAN. In fact, the Internet is the largest of all WANs.

Student Resource 12.5

Assignment Sheet: Internet Services Poster

Directions: Working with your group, create a poster to compare and contrast different Internet services based on what you have learned in this lesson and what is available in your area. Decide as a group how you will design the poster, and assign each group member a task such as researching, drawing, or writing up the information for a part of the poster.

Research

To begin, use the Internet to research at least one DSL and one cable service available in your area (if both are available). You may also want to include a satellite service if one is available in your area. When you do your research, use the home address of one of your group members to see what services you are offered by the cable, DSL, and satellite ISPs. Take notes on the download bandwidth, the price, and the materials needed to set up the connection.

Compare and Contrast

Create a chart, diagram, or other graphic organizer to compare and contrast the following aspects of the Internet services:

* The type of service providers and the infrastructure (telephone lines, cable lines, other) associated with each
* The type of physical components a user needs to connect to each type of network
* The advertised speed of each service and what kind of technology the service uses to attain the speed
* The cost of each service
* Benefits and drawbacks of different types of service

Draw a Conclusion

Work together as a group to determine which service you think would be the best choice for a home in your area and why. Be sure to consider both the cost and the benefits when making your choice. (For example, you may not want to choose the most expensive plan with 50 Mbps download speed unless you plan to do videoconferencing every day. Perhaps a slower speed that is less expensive would provide you with as much bandwidth as you need.)

Design Your Poster

Be sure to include these design elements when developing your poster:

* Use a chart or diagram to compare or contrast the Internet services.
* Include informative text with bullet points or short phrases to convey your meaning.
* Include at least one illustration.
* Make sure you state your conclusion clearly.

Make sure your poster meets or exceeds the following assessment criteria:

* The poster provides an accurate and complete comparison of the different Internet services available in the area.
* The poster accurately highlights the benefits and disadvantages of each service.
* The poster provides a convincing conclusion about why one particular service would be a good choice.
* The poster is neat and uses proper spelling and grammar.